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WATER RESOURCES CENTER ARCHIVES
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA

The Honorable Board of Directors
Santa Clara Valley Water Conservation District
60 North Second Street
San Jose 13, California

Gentlemen:

On December 7, 1954, your Board passed Resolution No. 390 instructing your Chief Engineer to prepare a report on a proposed Master Plan for this District. On March 7, 1955, a progress report on this investigation was presented to you outlining an overall plan for the maximum utilization of the water of this valley. Your Board approved in principle, this general plan and advised that the details be presented, together with an estimate of the cost.

Since this progress report was presented certain events have occurred which make it desirable to change certain features of the plan as presented at that time. The present report incorporates those portions of the progress report that are still applicable, includes new features developed in recent months and provides a cost estimate for the works to be constructed and the property to be acquired.

CHAPTER I

SUMMARY OF THE OPERATIONS OF EXISTING CONSERVATION FACILITIES

In 1935 and 1936 this District constructed the first of its major conservation works. These were Almaden Dam, Calero Dam, Coyote Dam, Guadalupe Dam, Stevens Creek Dam, Vasona Dam, Coyote Canal and Vasona Canal. These facilities were all placed in service in 1936 and have operated continuously since that time.

During the period from 1936 until 1943 the average depth to water in wells throughout the valley decreased by 76 feet. This rise in the water table was not entirely due to the District's operations, however. A detailed study made in 1947 showed that one-half of this rise was a natural rise that would have occurred even if the District had not been in operation. The other half was due to operations of the District's works.

In 1943 the average water level began to drop again, and continued to do so until 1950 at which time we had reached a new all-time low point. This drop between 1943 and 1950 was due to a severe dry cycle and an abnormally high pumping draft during the war and post-war years.

In order to stop this rapid drop in the average water level, the voters in the District in 1947 approved a bond issue to build a dam on the Los Gatos Creek. This project was held up, however, due to difficulties with the State Highway Department. While waiting for these problems to be settled, another bond issue was approved for construction of the largest of the District's dams - the Leroy Anderson Dam. This latter dam (the second largest composite type dam in the State) was completed in 1950 and the Lexington Dam on the Los Gatos Creek was finally constructed in 1952.

The storage capacity of the original storage reservoirs, constructed in 1935 and 1936, totaled 43,700 acre-feet. With this limited storage the District was able, during the wet cycle from 1936 to 1943, to double the rise that would have occurred under natural conditions.

With the completion of Leroy Anderson and Lexington Dams an additional storage capacity of 100,000 acre-feet was made available. The Leroy Anderson Reservoir completely filled the first year it was in operation. It was primarily due to this additional 75,000 acre-feet of storage that the District was able to reverse the rapid drop in the average water level. From the low point in the fall of 1950 to the low point in the fall of 1954 the average water level in the valley rose 21 feet.

It might seem at first thought that this additional 100,000 acre-feet of storage capacity had solved our problem in this valley. This is not true, however. In order to obtain the maximum benefit from the storage facilities that the District has, we must be able to percolate into the underground gravels, all the water that we are able to store in the year in which this water is stored.

We are very fortunate in Santa Clara Valley in that there is no outflow from our underground gravel strata, either to the bay or to other areas. Water which is percolated into this underground "reservoir" is safe from losses by evaporation, transpiration or outflow and remains "in storage" there until needed. The only withdrawal from this underground "reservoir" is by pumping from wells as needed.

In contrast to this safe method of storage in the underground gravels, the carryover storage in surface reservoirs is an inefficient method of conserving water. There are several reasons for this. One reason is the relatively large loss due to evaporation from a surface reservoir. As an example, in a reservoir the size of Leroy Anderson the evaporation loss can amount to as much as 6,000 acre-feet per year. Another reason for the inefficiency of surface carryover storage is that if the following year happens to be a wet one and the reservoir fills and runs over the spillway the carryover storage has been wasted.

The District in 1953 endeavored to partially alleviate this situation by voting additional bonds for the construction of two cross-valley canals. The Coyote-Alamitos Canal transports water from the Coyote River to the Guadalupe Creek. The Vasona Canal Extension transports water westward from Los Gatos Creek to Saratoga Creek. These additional facilities have been constructed and placed in service. In addition to these the District has constructed a canal to transport water from the Coyote River into the Evergreen area and a pipeline from Leroy Anderson Dam to transport water to an offstream percolation area in the Morgan Hill area.

In addition to the above facilities the District also operates the Upper Page Dam and Ditch which diverts water from Los Gatos Creek to San Tomas Creek; the Lower Page Dam and canal which formerly diverted water from Los Gatos Creek to offstream gravelly areas, but which now acts primarily as a spreading dam; and the Penitencia Percolation Ponds which percolate waters diverted from Penitencia Creek in the Berryessa area.

CHAPTER II

NEED FOR ADDITIONAL STORAGE AND DISTRIBUTION FACILITIES

The District now has storage capacity for 143,700 acre-feet of flood waters that would otherwise waste into San Francisco Bay. We are unable, however, to percolate all of this stored water into the underground gravels in the same year in which it is stored. This is primarily due to the fact that 70% of this water is stored on one stream (the Coyote River) and the remaining 30% is distributed over the balance of the valley.

In order to make possible the maximum utilization of these storage reservoirs, it will be necessary to distribute this water more uniformly over the valley. It was for this reason that this report was authorized by your Honorable Board. It is with this view in mind that the following analysis will be made to determine how best to achieve the results you desire.

The maximum percolation in the Coyote River at the present time is about 35,000 acre-feet per year. This rate can probably be increased an additional 5,000 acre-feet per year by the construction of additional spreading dams at strategic locations along the course of the river.

In addition to this percolation on the Coyote River itself the District proposes to divert 5,000 acre-feet per year to the Evergreen area through the new Evergreen canal. This is based upon the assumption that diversions will be made during 250 days throughout the year. If experience with the operation of this canal indicates that diversions can be made over a longer period each year it may be possible to increase the total diversions to approximately 6,000 acre-feet per year.

The District has also constructed a pipeline and canal to divert water from Leroy Anderson Reservoir to a new percolation pond on Main Avenue in the Morgan Hill area. This conduit system has a minimum capacity, at low reservoir level of 10 second-feet or 20 acre-feet per day.

This new percolation pond was placed in operation on April 7, 1955. Since that time the pond has been able to absorb water at a rate of about one acre-foot per acre per day or a total of about 8 acre-feet per day. At this rate we will be able to percolate about 3000 acre-feet per year in this pond. However, it is possible that we may be able to increase this rate in the near future as we obtain more information on the best method of operation of this pond. We hope to be able to ultimately increase the percolation here to about 5000 acre-feet per year.

Therefore, it is evident that the maximum possible use of water in the Coyote River, the Morgan Hill percolation pond and the Evergreen diversion is only about 51,000 acre-feet per year. This obviously does not permit the complete utilization of the 100,000 acre-feet of water that can be stored on the Coyote River, in the year in which it is stored.

In order to partially alleviate this situation the Coyote-Alamitos Canal was constructed to divert part of the Coyote River surplus to the Guadalupe Creek. This canal was designed to carry 50 second-feet or approximately 100 acre-feet per day as an unlined canal. This was the maximum rate at which the Guadalupe Creek and the Alamitos Percolation Pond could absorb water. The canal was so designed, however, that in the event that the District should ever desire to transport additional water westward from the Coyote River the capacity could be nearly doubled by concrete lining it. By so lining this canal its capacity can be increased to 90 second-feet or about 179 acre-feet per day.

If Almaden, Calero and Guadalupe reservoirs are filled, the maximum use of water from the Coyote River in the Coyote River, Evergreen area, Main Avenue percolation pond and Guadalupe Creek would be about 61,300 acre-feet per year. In order to utilize the maximum amount of water from the Coyote River system it will be necessary to transport part of this water further westward.

This can be accomplished by transporting water stored in Lexinton reservoir to San Tomas, Saratoga and Calabazas Creeks and replacing this transported water by diversion from the Coyote River to the Los Gatos Creek. Our records indicate that about 25,000 acre-feet of water per year can be percolated in the San Tomas, Saratoga and Calabazas creeks. This water can be supplied by the existing diversion facilities from Los Gatos Creek and extensions of these facilities. The 25,000 acre-feet diverted from the Los Gatos Creek to take care of the minor westward streams could then be replaced by an equivalent amount of water diverted from the Coyote River.

It is possible to make this transfer from Coyote River to Los Gatos Creek by constructing a pumping plant and a pipeline from the end of the existing Coyote-Alamitos canal to Los Gatos Creek. As was mentioned above, the capacity of the Coyote-Alamitos Canal can be increased sufficiently by concrete lining it to provide this additional water.

With this diversion of Coyote River water to the Los Gatos Creek the maximum percolation of Coyote River water that can be made when Almaden, Calero and Guadalupe reservoirs are filled will be about 86,300 acre-feet per year.

A continuing study is being made in cooperation with the Soil Conservation Districts in tye area to locate new percolation areas which will make it possible to percolate the remaining 13,700 acre-feet that will be available on the Coyote River in any year in which Coyote, Anderson, Almaden, Calero and Guadalupe Reservoirs are all filled.

In order to utilize the 25,000 acre-feet stored in Lexington reservoir on the west side of the valley it will be necessary to extend the pipeline which now runs from Vasona Canal to Saratoga Creek, from its present terminus, to the Calabazas Creek.

All of the above described distribution facilities should be installed with sufficient capacity to make possible the complete utilization of the water stored in the Coyote River system as soon as the development of new percolation facilities makes this possible.

The following tabulation provides a comparison between the present use of stored water and the use that will be possible with an expanded and enlarged distribution system:

TABLE I

Stream	Present Use in Ac-Ft.	Maximum Use in Ac-Ft.
Almaden	2,000	2,000
Calero	9,200	9,200
Coyote		
In Coyote River only	35,000	40,000
In Main Avenue Perc. Pond	0	5,000
Evergreen diversion	5,000	6,000
Diversion to Guadalupe Creek	10,300	10,300
Diversion to Los Gatos Creek	0	25,000
Diversion to new percolation areas on westside (when developed)	0	13,700
Guadalupe	3,500	3,500
Los Gatos	25,000	25,000
Stevens Creek	4,000	4,000
TOTALS	94,000	143,700

The above analysis outlines the physical features of an expanded and enlarged distribution system that would enable the District to percolate in one year all of the water that can be stored in the existing reservoirs.

With the ever increasing demand for water in this area brought on by the industrial and urban growth of the area and the changing use of agricultural lands to greater water-using crops, the District will have to develop all local water supplies and ultimately will have to import water from outside sources.

The logical terminal storage facilities for imported water would be Coyote and Leroy Anderson reservoirs. They are located on the East side of the Valley which would be the point of delivery of practically all proposed supplemental water supplies. Furthermore, these two reservoirs would, under the expansion program outlined above, be the major source of supply for the entire Valley. The entire distribution system, as proposed above, would be served by the storage facilities on the Coyote River. If and when imported water were available, at a price the people could afford to pay, these two reservoirs could be filled every year, whether wet or dry.

The District must not overlook the fact that there are still undeveloped waters here in Santa Clara Valley, which should be put to beneficial use as rapidly as possible. This will necessitate the construction of new storage dams on some of the streams that are now uncontrolled. These new dams and reservoirs will serve a dual purpose. In addition to salvaging waste water they will also provide flood protection to the valley areas below them.

Probably the most important of these new dams, from a water conservation standpoint, is a proposed dam on the South fork of the Penitencia Creek. The Penitencia Creek is uncontrolled, except for a small storage reservoir belonging to the City of San Jose, on the North fork of this stream. During storms large quantities of water flow unchecked down this stream and waste into San Francisco Bay. Frequently these flood flows are of such magnitude that great damage is caused to the lands in the Valley floor in the Berryessa district. A dam on the South fork of the stream would, in addition to salvaging waste waters now discharging into the Bay, provide a large measure of flood control to the presently endangered area.

The District has constructed offstream percolation ponds in this area which are served by water diverted from the Penitencia Creek. It is possible to operate these ponds, however, only for short periods each year due to the necessity of waiting until the stream flow clears up before diversions can be made into these ponds. If a storage reservoir were to be constructed, as proposed above, these ponds could be operated for several months continuously.

These ponds have a high sustained percolation rate and serve an area in critical need of additional water. Past records indicate that when these ponds are in operation, the water in wells in the Berryessa area rises as much as five feet per week. The wells in this area are dependent upon the local sources of supply within the area to a large extent, so that any additional percolation in this vicinity will be of great benefit to the area.

The District should also construct a second dam on the Guadalupe, or Los Capitancillos Creek. The present Guadalupe Dam only controls about 50% of the watershed of the Los Capitancillos Creek and only about 30% of the runoff. The remaining one-half of the watershed drains into this creek below the present Guadalupe Dam. By constructing a dam near the mouth of the canyon it will be possible to control most of the balance of the run-off from this watershed.

The area traversed by the Los Capitancillos Creek between the point at which it leaves the hills and its junction with the Los Alamitos Creek is a highly receptive gravel area. By the construction of low spreading dams and diversions to offstream gravelly areas the additional water stored by a second Guadalupe dam could be percolated in this area. This area is dependent upon the flow of the Los Capitancillos to maintain the water levels in the wells at an economic depth, and in many cases to prevent the wells from drying up completely.

In the progress report that was submitted on March 7, 1955, it was proposed that a dam be construction on the Calabazas Creek on the West side of the Valley. This dam had originally been proposed by Mr. Tibbetts in the Tibbetts & Kieffer report of 1921. At the time it was felt, however, that the expenditure of District monies for this dam was not justified due to the low annual yield. In the March 7 progress report of this year, it was proposed that this dam be built as a dual purpose structure which would provide water conservation storage and also flood control.

In any area such as this where continuing urban development is at a standstill due to lack of proper storm drainage, and where the flood damage potential is high, the benefits to be derived by storing part of the flood waters are far greater than those obtained by providing large enough channels to rapidly drain these waters off into the Bay. By the construction of a dual purpose dam in the mountain area to stop flood waters from the hills, the amount of work required in the valley floor area to dispose of the storm runoff from subdivisions is lessened.

Since this proposal was made the District has filed an application for a water right on Soquel Creek in Santa Cruz County. The water diverted from this source would flow into Lexington Reservoir on Los Gatos Creek and would be transported from there to San Tomas, Saratoga and Calabazas Creeks.

To further complicate this problem is the possibility of diverting Saratoga Creek into the Calabazas reservoir site. This would probably be a more practical way to salvage the waste waters of Saratoga Creek than by constructing a storage reservoir on Saratoga Creek itself.

In view of the fact that there are these several factors that cannot be resolved at the present time, it is deemed advisable to make a further study of the Calabazas-Saratoga-Soquel problem before proposing any definite plan of construction.

A third site which should be considered for construction of a dam is located on Silver Creek. This site presents peculiar problems not encountered at any of the other sites. A dam can be constructed on Silver Creek below the elevation of the Evergreen Canal which will capture all of the flood waters of Silver Creek and by construction of a diversion canal from Dry Creek near Yerba Buena Creek can also capture all of the runoff of Dry Creek originating above the point of diversion. The problem here is that there are no percolation areas below this damsite in which the water can be diverted into the underground gravels.

This dam, however, would provide almost complete flood control for Silver and Dry Creeks. The Flood Control District has plans to construct a diversion conduit to divert the flood waters of these two streams directly into the Coyote River near Loupe Avenue. Such a diversion would not be necessary if a dam, as proposed, were to be constructed.

There is probably no portion of the Valley that is in more dire need of additional water than this Evergreen area. The problem then would be how to put the water saved by the construction of this dam to beneficial use.

In the Evergreen area, well yields are very low. The average yield in the upper portion of this area is only about 1½ gal. per min. per foot of drawdown. In the lower and northerly portion of the area the average yield is only about 7 gal. per min. per foot of drawdown. These are extremely low yields when we consider that in the central portion of the Valley yields vary from about 25 to 85 gal. per min. per foot of drawdown.

Under these circumstances it would be of greater benefit to the area to utilize the water stored in this proposed reservoir for direct surface irrigation. This would eliminate most of the draft upon the underground supply in the area and would make possible a rapid rise in the underground water which would be brought about by percolation from the Evergreen Canal.

Furthermore, water could be diverted from the Coyote River system by the Evergreen Canal, into this proposed reservoir when needed. Such a program would be of much greater benefit to this area than will be obtained by percolation alone from the Evergreen canal.

The above analysis constitutes a "Master Plan" for the District which would assure maximum utilization of our local water resources. As mentioned above, it also provides a distribution system to most effectively utilize waters imported from outside sources.

The detailed descriptions of the various structures required to put this Master Plan into effect, together with cost estimates for the acquisition of lands, construction of facilities and operation of these facilities are given in the following Chapter.

CHAPTER III

DISTRIBUTION SYSTEM

As explained in Chapter II the District cannot percolate all of the water that it can store in the year in which it is stored. It was pointed out previously that this leads to a waste of water in wet years due to loss of carryover storage and an unnecessary loss by evaporation in all years.

In order to correct this situation it is recommended that the District enlarge and expand its present distribution facilities so that all the water that can be stored in any one year can be utilized in that same year.

This can be done by expanding our distribution system so that more water can be transported from the East side of the valley to the West side. Specifically this involves increasing the capacity of the Coyote Canal, Coyote Canal Extension and Coyote-Alamitos Canal and the construction of a pumping plant and pipeline to take water from the terminus of the Coyote-Alamitos Canal to Los Gatos Creek. It also involves construction of a pumping plant and pipeline to transport water from the present terminus of the Vasona Canal Extension at Saratoga Creek to Calabazas Creek.

Details of the work proposed are given below:

(a) Coyote Canal

This canal was originally constructed in 1936 to transport a maximum flow of 100 cubic feet per second. With the expanded distribution system planned it will be necessary to provide additional capacity in this canal. he minimum capacity under the expanded system will be 125 cubic feet per second with the possibility of a slightly higher capacity if and when new percolation areas are developed.

This increased capacity of the Coyote Canal can easily be achieved. By running a dragline over the entire 9 mile length of this canal it can be completely cleaned out and slightly enlarged so that it will carry in excess of the required 125 cubic feet per second. It will also be necessary to enlarge some of the structures on this canal and to concrete line a section in the vicinity of Mile 5.3.

This work can be done during the period when the Coyote Canal is not in operation so as not to interfere with its use during the Summer months.

(b) Coyote Canal Extension

This canal was constructed on a pay-as-you-go basis about 15 years ago. Its original capacity was 40 cubic feet per second.

In order to transport a minimum of 100 cubic feet per second Westward from Metcalf Road and a minimum of 10 cubic feet per second through the Evergreen Canal it will be necessary to enlarge the first mile and a half of this canal to provide a minimum capacity of 110 cubic feet per second.

This can be done by enlarging the cross-section of the existing canal and concrete lining the enlarged portion. his work would cover that portion of the canal between its head, East of the town of Coyote, and Metcalf Road.

(c) Coyote-Alamitos Canal

This canal was constructed in 1953 to transport a maximum of 50 cubic feet per second from the Coyote River system to Guadalupe Creek. It is an unlined side-hill canal which takes water from the Coyote Canal Extension at Metcalf Road and runs about 9 miles in a westerly direction terminating in the District's Alamitos Percolation Pond on Guadalupe Creek near Downer Avenue.

In order to transport an additional 50 cubic feet per second through this canal to supply the proposed diversion facilities to Los Gatos Creek it will be necessary to double the capacity of this Coyote-Alamitos Canal. This can be done by concrete lining the existing canal.

(d) Alamitos-Los Gatos Distribution System

This proposed conduit would consist of a pumping plant to be constructed at the present terminus of the Coyote-Alamitos Canal and a pipeline which would run through District property to Siefert Road and thence along Siefert Road, Kooser Road, Camden Avenue, San Jose-Los Gatos Road, Redding Road and a short distance over private property to the Upper Page Dam.

This route eliminates the necessity of purchasing expensive rights of way and also provides a route with a lower pumping head than would be obtained by running over Blossom Hill Road. This route enters Los Gatos Creek below Vasona Dam but above the major percolation areas on this creek. his route also delivers water to the Los Gatos Creek at a point from which it can be diverted into the Upper Page Ditch and the Page Ditch percolation ponds.

If, at any time in the future, it becomes desireable to transport this water further westward through the Vasona Canal to Saratoga Creek and Calabazas Creek it can be readily done by installing an auxiliary pumping plant and pipeline to conduct this water from Page Percolation Ponds along the Santa Clara-Los Gatos Road to Vasona Canal. It is not feasible to pump all the water that will be diverted to Los Gatos Creek to the higher elevation required to discharge it into Vasona Canal.

This system will consist of a pumping plant capable of lifting 40 cubic feet per second from elecvation 197 at the end of the Coyote-Alamitos Canal to elevation 257 at the high point on the line in the vicinity of Kooser Road and Camden Avenue. The line then runs to Upper Page dam at elevation 240. The Total length of line would be six and one-half miles and would consist of either 48" steel or 48" concrete pipe.

(e) Saratoga-Calabazas Conduit

In 1953 the District constructed a pumping plant and pipeline to conduct water from the Vasona Canal to Saratoga Creek. This line runs along a right of way acquired from the Southern Pacific Railroad. At the same time the District acquired right of way to extend this line along the S.P.R.R. property from Saratoga Creek to Calabazas Creek.

It is proposed that an auxiliary pumping plant be installed near Saratoga Creek to lift water from elevation 313 through 1.6 miles of 24" steel pipe to elevation 320 at Calabazas Creek. This proposed line would transport 5 cubic feet per second from the existing Vasona Canal Extension to Calabazas Creek.

As was explained in Chapter II, the above described distribution system will enable the District to percolate practically all of the water that can be stored, even in wet years, in the same year in which it is stored.

ADDITIONAL PERCOLATION FACILITIES

Together with the need for expanded distribution facilities, the District is confronted with a need for additional percolation facilities in order to obtain the maximum benefit from the works already constructed.

The District has made cooperative agreements with the three Soil Conservation Districts in the valley with the object of locating new percolation areas either in existing stream beds or in offstream areas.

It is recommended that the District with the cooperation of the three Soil Conservation Districts, make a complete study of all possible new percolation areas and prepare detailed plans for their construction. It is further recommended that the District then proceed with the construction of these new facilities. The most pressing need for such additional facilities is on the Coyote, Guadalupe and Los Gatos Creeks, but all possible locations that can be served by existing or proposed distribution facilities should be investigated.

IMPROVEMENTS TO EXISTING FACILITIES

In addition to the expanded distribution facilities and the additional percolation facilities outlined above it is recommended that the existing Almaden-Calero Canal, Coyote Canal Extension and Evergreen Canal be concrete lined. In each case the capacity of the existing canals can be practically doubled by concrete lining them.

In the case of the Almaden-Calero Canal this will make possible the transfer of water from Almaden Reservoir to Calero Reservoir at practically double the present rate. This means that a greater portion of the waters of Almaden Creek can be salvaged than is now possible. Almaden Dam with a storage capacity of only 2000 acre-feet fills very rapidly during large storms and runs over the spillway even when the Almaden-Calero Canal is operating. By increasing the capacity of this canal much of this water that now goes to waste can be salvaged.

By lining the Coyote Canal Extension from Metcalf Road to its terminus at the Evergreen pump and by lining the Evergreen Canal from its head to the Silver Creek Crossing it will be possible to transport approximately 20 cubic feet per second through this system in contrast to the present maximum capacity of 10 cubic feet per second.

PENITENCIA CREEK DAM

The necessity for a dam on Penitencia Creek to store waters now wasting into the Bay and also to provide flood protection to the Berryessa area was discussed in Chapter II. This proposed dam would be a conventional earth and rock fill dam with a concrete lined spillway. The dam would be located on the South fork of the Penitencia Creek (also known as the Arroyo Aguague) about 1 mile above the falls. It would be 170 feet high from streambed to crest with a freeboard of 15 feet. Crest length would be 455 feet. The spillway would be designed for a maximum flow of 7000 cubic feet per second. The storage capacity of the reservoir would be 4500 acre-feet and would have a drainage area of 13.23 square miles.

An inspection of the site reveals suitable foundation for this type of dam and an abundance of materials for its construction. There are no public roads in the reservoir area and the entire area consists of mountain grazing lands with no improvements.

The average annual yield from a 4,500 acre-foot reservoir, at this site would be 2565 acre-feet. This amount of water will enable the District to operate the existing percolation ponds below Noble Avenue for a period 3 months longer than can be done at the present time. In any year that the reservoir fills it will take about 4½ months to percolate all the water that can be stored.

As was pointed out previously, it must be remembered that this dam will provide flood protection to the Berryessa area, in addition to its water conservation benefits. The reservoir can be operated in such a way as to provide flood protection to the valley area below at all times.

SECOND GUADALUPE DAM

The need for a second dam on Guadalupe Creek was discussed in Chapter II. There is a suitable site for a relatively low earth fill dam that would store 5000 acre-feet near the mouth of the canyon at a point about 3/4 miles below Shannon Road.

This dam would be 80 feet high from streambed to crest and have a crest length of 2375 feet. The dam would have 15 feet freeboard above spillway lip and the spillway would be a concrete lined chute type with a capacity of 10,000 cubic feet per second. Preliminary investigations of the site indicate rather heavy stripping for the foundations but that there is satisfactory foundation material for the type of dam proposed. There are abundant materials available at the site for construction of the dam.

The average annual yield of a 5000 acre-foot reservoir at this site would be 3500 acre-feet. It is proposed to percolate this water primarily in the extensive gravel deposits lying between the damsite and the Alamitos Percolation Ponds. There are several sites in this section of the Guadalupe where relatively simple structures can be installed to form extensive percolation ponds.

This dam would also serve a dual purpose. In addition to salvaging for beneficial purposes, water now going to waste, it will also provide a large measure of flood protection, especially on that portion of Guadalupe Creek north of San Jose.

SILVER CREEK DAM AND EVERGREEN DISTRIBUTION SYSTEM

The proposed dam on Silver Creek would be located about 2 3/4 miles upstream from Loupe Avenue. This is the same location proposed by the State Engineer for construction of a 32,500 acre-foot reservoir in connection with his proposed eather River Project. It is proposed that the District construct a dam creating a reservoir with a capacity of 2500 acre-feet but that it be so constructed that it can be ultimately enlarged, if needed as a terminal storage or in-transit regulating reservoir, on any State, Federal or other project.

The proposed dam would be 77.5 feet high above streambed and have a crest length of 850 feet. It would have a freeboard above spillway lip of 15 feet and the spillway would have a capacity of 2500 cubic feet per second. The reservoir would store runoff from Silver Creek and by means of a short diversion canal would also capture the runoff of Dry Creek. The total drainage area controlled by this dam would be about 7.8 square miles.

The average annual yield from this reservoir would be only 940 acre feet. However, it is possible to transport water from the Coyote River system through the Evergreen Canal into this reservoir.

Here again this dam would serve a dual purpose. The Santa Clara Flood Control & Water Conservation District had plans for a canal to divert the flood waters of both Silver Creek and Dry Creek into the Coyote River and thence into the Bay. This project has commonly been referred to as the Loupe Avenue Cutoff. By constructing a dam that would impound the maximum anticipated runoff of both Silver Creek & Dry Creek the necessity for this Loupe Avenue Cutoff has been eliminated.

Wherever possible in this valley, flood control should be accomplish by storing flood waters rather than providing larger or more direct channels by which they can be discharged into San Francisco Bay. In this area where the need for conserving every possible drop of water is so urgent no project that unnecessarily wastes water should be considered.

This Silver Creek dam poses a problem that does not exist in connection with any of the other dams. In asmuch as there is practically no percolation in Silver Creek below the damsite the problem is how best to dispose of the water stored.

In December 1944 the Regional Water Conservation Division of the Soil Conservation Service presented "Progress Report, Water Supply Investigations, Evergreen Soil Conservation District." This report pointed out the need for a supplemental supply of water for irrigation purposes in the Evergreen area. It was proposed at that time that the Evergreen area construct a dam at the same site now proposed and that the water be used for direct irrigation. The Soil Conservation Service proposed the construction of two canals to serve an area of approximately 5000 acres, one canal at elevation 200 and the other at elevation 400.

It is recommended now, however, that inasmuch as the District has already constructed a canal through this area at elevation 500 that this existing canal be enlarged and utilized for distribution of water from this Silver Creek reservoir. By so doing, an area can be served which is in much more critical need of supplemental water than the area below elevation 400 and it will also permit service to the lower area.

This can be accomplished by installing a pump at the dam with a pipeline about 1000 feet long to raise the water to elevation 515. It will then be discharged into a concrete lined canal about 1½ miles long running along the Easterly side of Silver Creek reservoir to connect with the existing Evergreen canal at the saddle between Silver Creek and Dry Creek. That portion of the Evergreen canal easterly of this saddle will be enlarged to carry 30 cubic feet per second. Of this total of 30 cubic feet per second capacity, 20 cubic feet per second will be reserved for irrigation water from Silver Creek reservoir and the remaining capacity will be utilized for transportation of water for percolation in Dry Creek and Yerba Buena Creek.

CHAPTER IV

COST ESTIMATE FOR PROPOSED WORKS

An estimate of the cost of constructing the above-described works, together with the cost of acquiring rights of way, constructing roads, relocating utilities and all other costs incidental thereto has been prepared. Estimates of construction costs are based on current construction prices and include the cost of engineering and an allowance for contingencies. Table II below gives a resume of the various proposed works with the estimated cost of each.

TABLE II
SUMMARY OF PROPOSED WORKS AND COST ESTIMATES

Penitencia Creek Dam	$1,204,000
Silver Creek Dam	831,000
Second Guadalupe Dam	2,524,000
Alamitos-Los Gatos Distribution System	1,000,000
Concrete Line Coyote Alamitos Canal	710,000
Enlarge Coyote Canal Extension South of Metcalf Road	80,000
Increase capacity of Coyote Canal	70,000
Evergreen Distribution System	181,000
Improvement to existing Almaden-Calero Canal, Evergreen Canal and Coyote Canal Extension	655,000
Saratoga-Calabazas Distribution System	70,000
Additional Percolation Facilities	150,000
Sub-Total	$7,475,000
Preparation of Plans and Specifications for Soquel Diversion, Saratoga Creek Diversion and Calabazas Creek Dam	25,000
TOTAL	$7,500,000

Inasmuch as the District cannot finance this project out of its normal revenues it is recommended that the Board of Directors of the District call a bond election to obtain approval of the voters for financing this project with bonds of the District. It is further recommended that construction be started as rapidly as possible after approval for issuing bonds is received.

NECESSITY FOR AND VALUE OF PROJECT

The Master Plan described above has a fourfold purpose,

a) By constructing the new distribution facilities as described above and by increasing the capacity of existing distribution facilities the District will be able to make more complete and beneficial use of waters which it now is able to store. At the present time the District cannot percolate more than 94,000 acre-feet of water per year. This means that in any year in which more than this amount is stored the District will have carryover storage into the succeeding year. As was explained in Chapter I carryover storage is not an efficient way to utilize our available water. The safest and best storage place we have is our underground gravel stratas. We should be in a position to be able to percolate into these underground grovels all of the water we can store in the same season in which it is collected in the surface reservoirs. This can only be done by expanding the distribution system as described in Chapter III.

b) The same expanded distribution system that is needed to make the most efficient use of our present storage capacity will also be available for distribution of water from outside sources. It was pointed out in Chapter II that Coyote and Leroy Anderson reservoirs are the logical terminal storage sites for supplemental water that will someday have to be imported from outside sources. This fact was in mind when the above described distribution system was designed. As a result it has been designed to utilize the complete storage capacity of these two reservoirs in one season. If these two reservoirs are filled by natural runoff or by water imported from some other source, we can be assured that all of it will be diverted into our underground gravels which we can very aptly call our "water bank."

c) In addition to the absolute necessity of expanding our distribution system the District has a responsibility to make the maximum possible use of all of our local water supply. Although we recognize the fact that the demand for water in this valley will ultimately exceed our local source of supply, thereby necessitating the importation of water, we should not relax our efforts to make the maximum possible use of all locally available water, because, as will be explained below, this is the cheapest water we can get.

With this thought in mind the proposed construction of three new dams was recommended. As was explained above these three dams will control the three major sources of waste water that are now uncontrolled. Two other streams that waste important amounts of water each year are the Saratoga and Calabazas. Although the salvaging of the waste waters from these two streams is included in the District's Master Plan for the valley there are several complicating factors in connection with these two streams that make it impossible to determine at the present time the best possible solution to these problems. As a result the present proposal includes only sufficient money to make a complete engineering study of the various aspects of these problems and to prepare plans for their solution.

d) The most important problem in Santa Clara Valley today is the control of water. This includes the maximum possible use of available water supplies and the control of damaging flood waters in such a way as to waste the minimum possible amount of this precious commodity. The Master Plan for the District is designed with both of these needs in mind. The three dams which are proposed for construction and the two streams for which it is proposed to develope plans, all serve the dual purpose of water conservation and flood control.

In order to assess the cost of water salvaged by the District a detailed analysis was made of the cost per acre foot of water salvaged by the District's works.

To make such a study it was necessary to determine the average annual yield from the existing facilities and also of the combined facilities as described in Chapter III. As a basis for such a study the 13-year period 1935-36 to 1947-48 was used. During this period the precipitation averaged 101% of the 50-year normal from 1897-98 to 1946-47 and the runoff averaged 101% of the 53-mean from 1894-95 to 1946-47. This is the same interval used by the Division of Water Resources in their Santa Clara Valley Investigation.

The average annual yield from the existing facilities of the District is 91,100 acre-feet. This can be increased to 101.100 acre-feet by the construction of the works described in Chapter III.

In determining the average cost per acre-foot for water salvaged by the District it must be remembered that the District, by law, is required to pay off its bonded indebtedness in not more than 25 years whereas the life of the structures constructed by the District is at least 100 years. As a result the cost per acre-foot has been computed on the 100 year basis with bond retirement and interest occurring during the first 25 years only. Table III below gies the results of this study.

TABLE III

(A)	For Existing Facilities:		
	Total capital cost to District		$9,350,000.00
	Interest for 25 years		2,976,298.16
	Sub-Total		12,326,298.16
	Maintenance and operation for 100 years	(1)	35,000,000.00
	Total cost of water salvaged		$47,326,298.16
	Total water salvaged in 100 year period		9,110,000 acre-f
	AVERAGE COST PER ACRE FOOT		$5.19
(B)	For Proposed Development of Local Supplies (Master Plan)		
	Total capital cost to District		$16,850,000.00
	Interest for 25 years		4,806,298.16
	Sub-Total		21,656.298.16
	Maintenance and operation for 100 years	(1)	35,000,000.00
	Total cost of water salvaged		$56,656,298.16
	Total water salvaged in 100 year period		10,110,000 acre-f
	AVERAGE COST PER ACRE FOOT		$5.60

Note. (1) The total General Fund revenue for the current 1955-56 fiscal year is $282,806.38. This represents the maintenance and operation costs of the existing works. It is assumed that as the District's activities expand this cost will necessarily rise somewhat. An average annual maintenance and operation cost of $350,000 is assumed for this 100-year period.

It is evident from an inspection of the cost figures given in Table III that water salvaged from our local sources is much cheaper than any imported water. As an example of the cost of imported water we have estimates of the State Engineer that the cost of Feather River Project water to Santa Clara County would be $22.50 per acre-foot.

By proceeding with the program outlined herein, the people of Santa Clara Valley can obtain an additional 10,000 acre-feet of water from our own local sources at an increase in cost of only $0.41 per acre-foot above what we are now paying. At the same time we will have acquired a distribution system that will be available for putting to beneficial use any imported water that may be made available to us in the future.

RECOMMENDATIONS FOR FINANCING

As was explained previously, this project cannot be financed out of the normal revenues of the District, and as a result the District will have to vote bonds to pay the costs of this project.

The District's first issue of bonds will be paid off in 1959-60 and its second issue in 1960-61. By deferring principal payments until 1960-61 it will be possible to keep the tax rate for bond interest and redemption, together with the general fund, from exceeding one dollar.

The following analysis indicates the probable tax rate that would be necessary under each of two plans, one in which principal payments would extend over the full 25 years and the other in which principal payments would be deferred for 5 years.

TABLE IV

(A) $7,500,000 in bonds repayed in 25 years

Annual principal payment	$ 300,000.00

1956-57 fiscal year	
Principal & Int. on 1st to 6th issues inclusive	514,582.50
Principal payment on $7,500,000 issue	300,000.00
Interest on $7,500,000 issue at assumed rate of 3½%	262,500.00
Total for bond interest & redemption	$1,077,082.50
Estimated General Fund revenue	295,000.00
Total to be raised	$1,372,082.50
Rate assuming assessed valuation of $118,000,000	$1.16
1960-61 fiscal year	
Principal & interest on 1st to 6th issues inc.	397,237.50
Principal payment on $7,500,000 issue	300,000.00
Interest on $7,500,000 issue at assumed rate of 3½%	220,500.00
Total for bond interest & redemption	917,737.50
Estimated General Fund revenue	300,000.00
Total to be raised	$1,217,737.50
Rate assuming assessed valuation of $154,000,000	0.79

(B) $7,500,000 in bonds with principal payments deferred 5 years

1956-57 fiscal year	
Principal & interest on 1st to 6th issues inc.	514,582.50
Interest on $7,500,000 issue at assumed rate of 3½%	262,500.00
Total for bond interest & redemption	777,082.50
Estimated General Fund revenue	295,000.00
Total to be raised	$1,072,082.50
Rate assuming assessed valuation of $118,000,000	0.91
1960-61 fiscal year	
Principal & Interest on 1st to 6th issues inc.	$ 397,237.50
Principal payment on $7,500,000 issue	350,000.00
Interest on $7,500,000 issue at assumed rate of 3½%	262,500.00
Total for bond interest & redemption	$1,009,737.50
Estimated General Fund revenue	300,000.00
Total to be raised	$1,309,737.50
Rate assuming assessed valuation of $154,000,000	0.85

CONCLUSION AND RECOMMENDATIONS

Due to the ever-increasing demand for water in this valley it is imperative that the District make the maximum possible use of all locally available supplies as rapidly as possible. We cannot wait until some outside source of water is made available to us here in Santa Clara Valley. The Master Plan described in previous Chapters provides for the maximum utilization of our local water supplies and give us the cheapest additional water that we can obtain.

In addition to this the above-described plan provides a large measure of flood protection to the valley area. The prevention of flood damage by storing those waters for beneficial use is the most practical solution to the flood control problem in this area.

It is recommended that the Board of Directors of this District present to the people of the District a proposal to issue bonds in the amount of $7,500,000 to finance the construction program outlined above, together with the costs of necessary lands and rights of way, as well as the cost of the bond election and the administrative, legal and clerical costs incidental thereto, and also together with the costs of preparing plans and specifications for the Soquel diversion, the Saratoga diversion and the Calabazas dam and reservoir, and upon approval by the voters, that work be started on the project immediately. The Board will note that following the preparation of the plans and specifications for the Soquel diversion, the Saratoga diversion and the Calabazas dam and reservoir, the Board will have for decision the questions of the feasibility and the proper method of financing the works proposed in such plans and specifications.

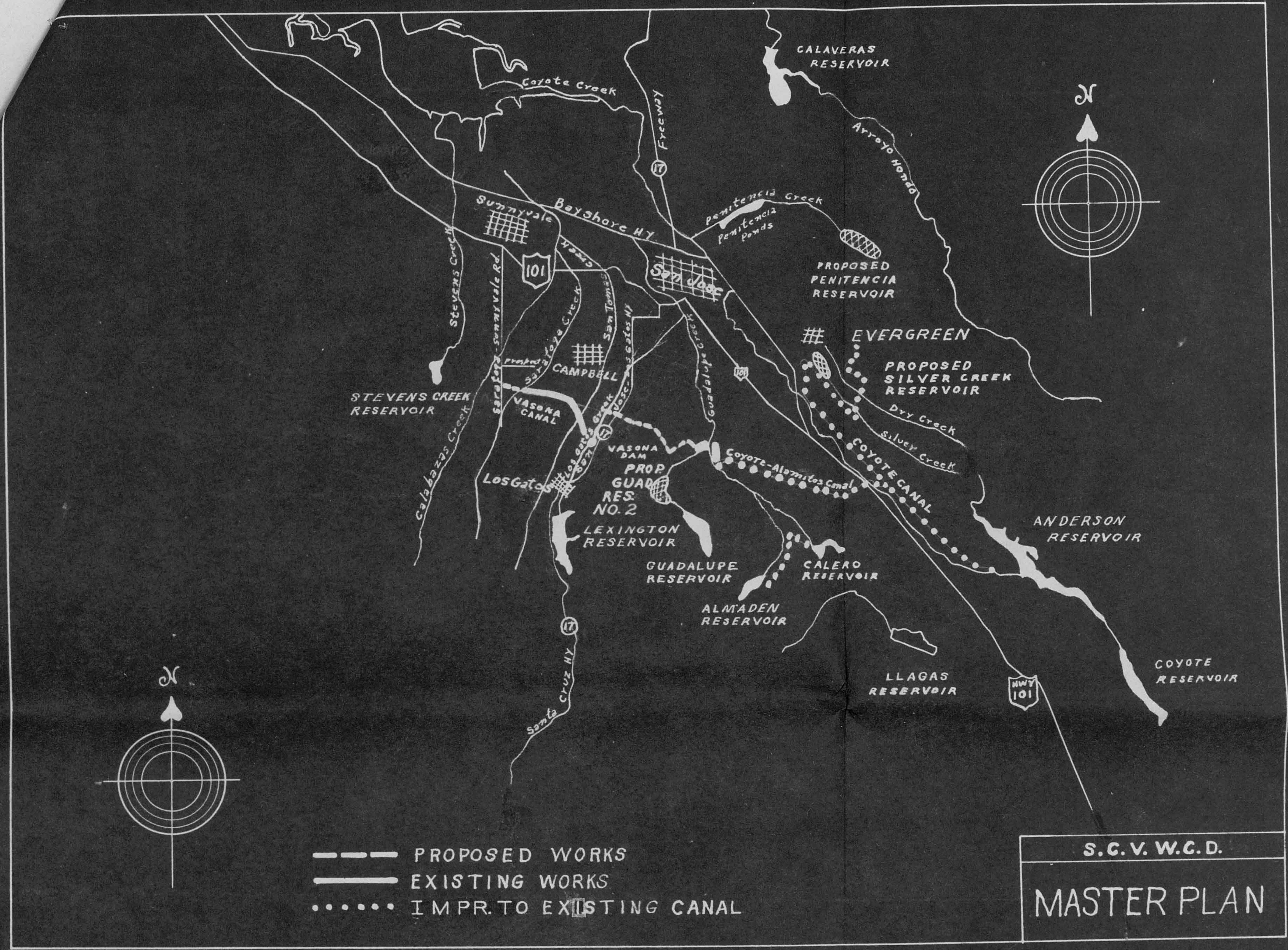
It is further recommended that the principal payments on these bonds be deferred for five years (until the District's first and second bond issues are retired) thereby making it possible to keep the combined tax rate for bond interest and redemption and for the general fund purposes below one dollar per one-hundred dollars of assessed valuation of land alone.

It is further recommended that, in the event that there remains from and out of said sum of $7,500,000 a surplus after the completion of the works described above, together with the acquisition of necessary lands and rights of way, and the costs of the election, and the costs of preparing plans and specifications for the Soquel diversion, the Saratoga diversion and the Calabazas dam and reservoir, that such surplus be used for the completion of other works, property acquisitions and structures necessary and convenient for the conservation works of the District.

Respectfully submitted,

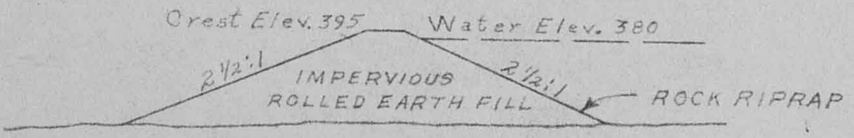
October 3, 1955

J. ROBERT ROLL
Chief Engineer & Manager



S.C.V.W.C.D.

MASTER PLAN



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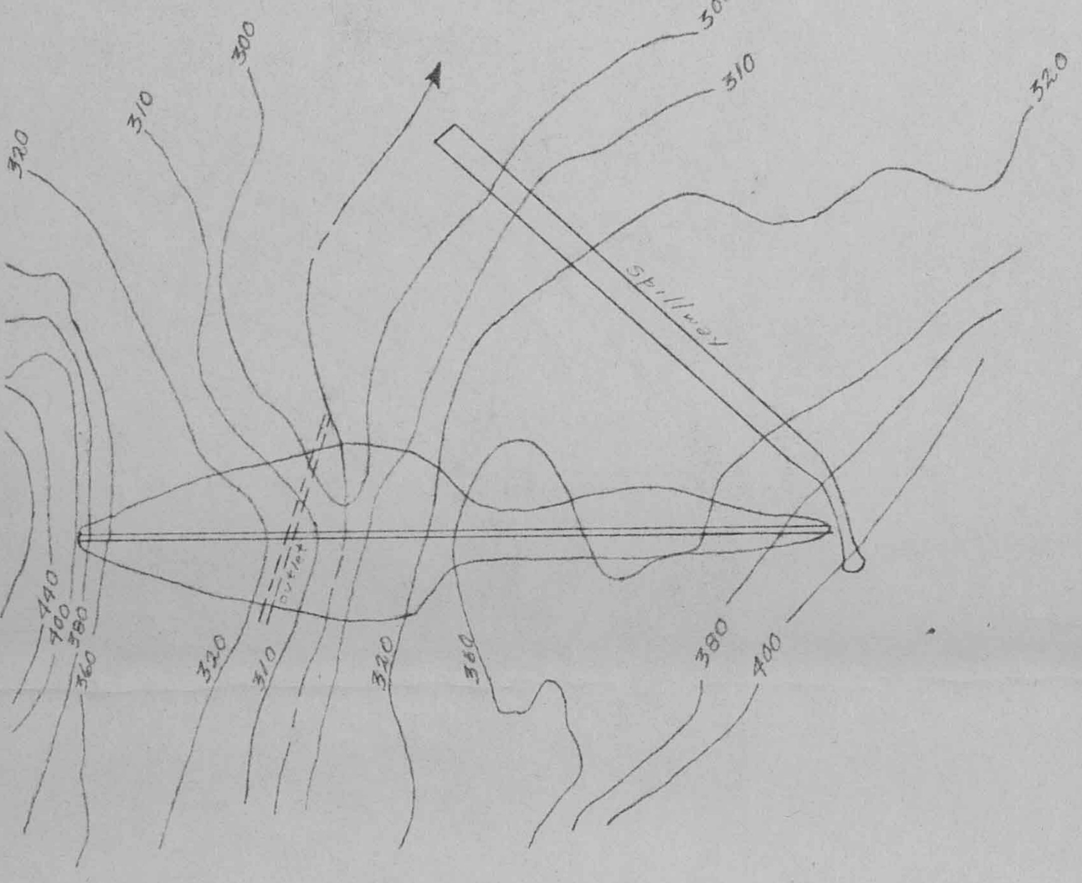

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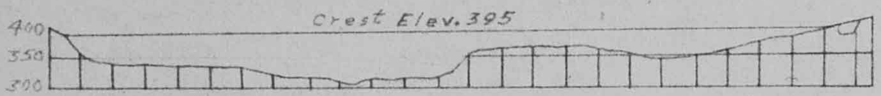

PROFILE

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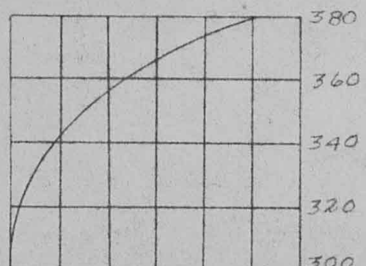
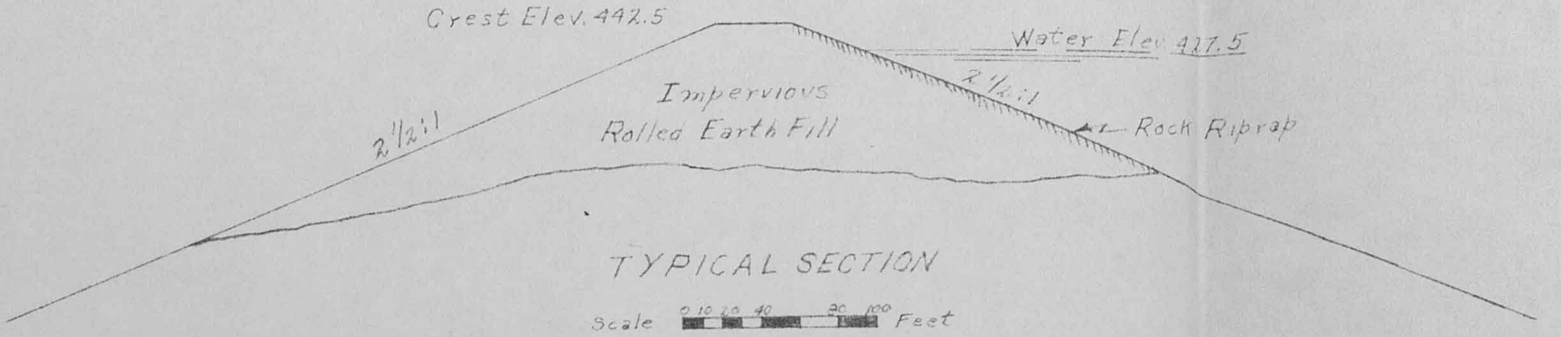
CAPACITY CURVE



S. C. V. W. C. D.

GUADALUPE RESERVOIR
NO. 2



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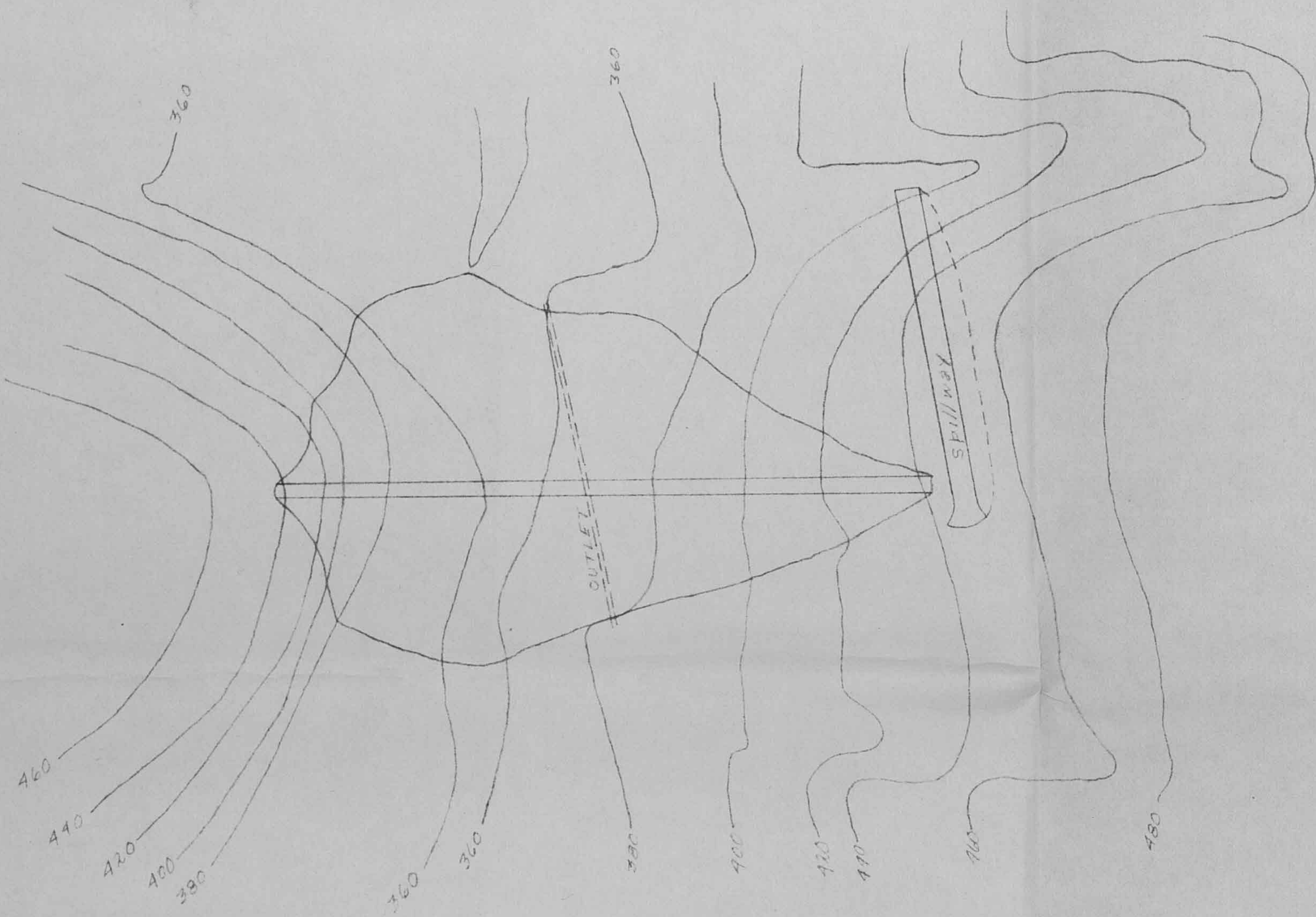

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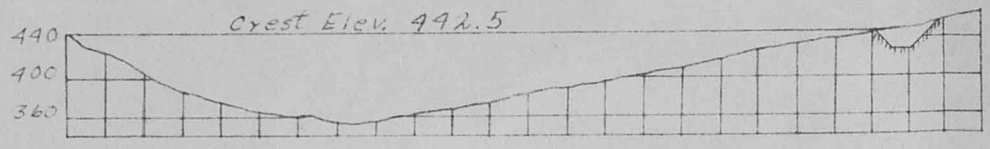

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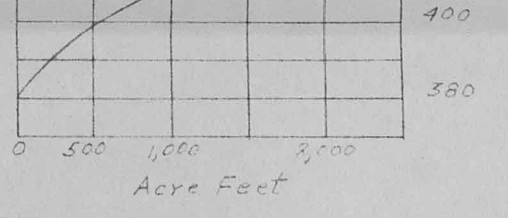
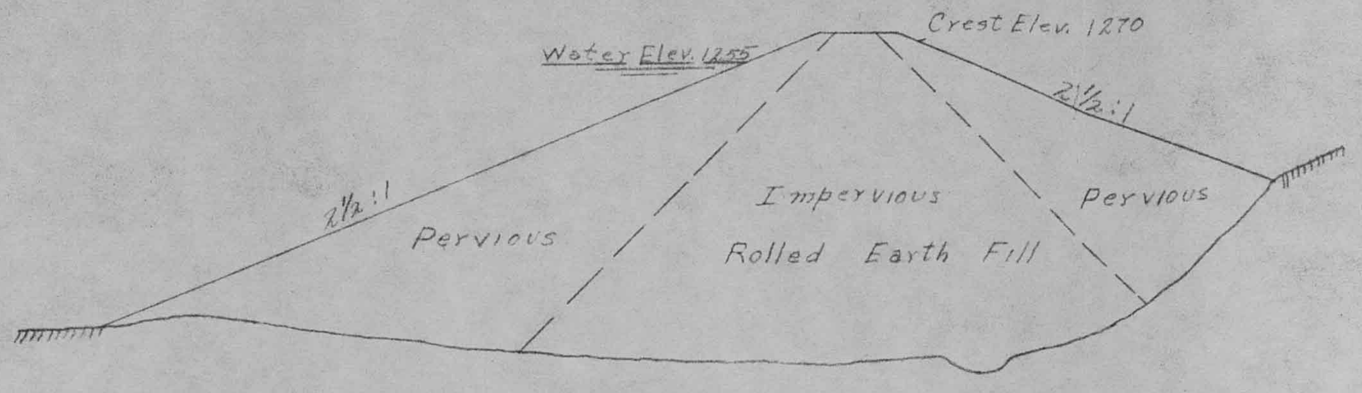


CAPACITY CURVE

S. C. V. W. C. D.

SILVER CREEK
RESERVOIR



TYPICAL SECTION

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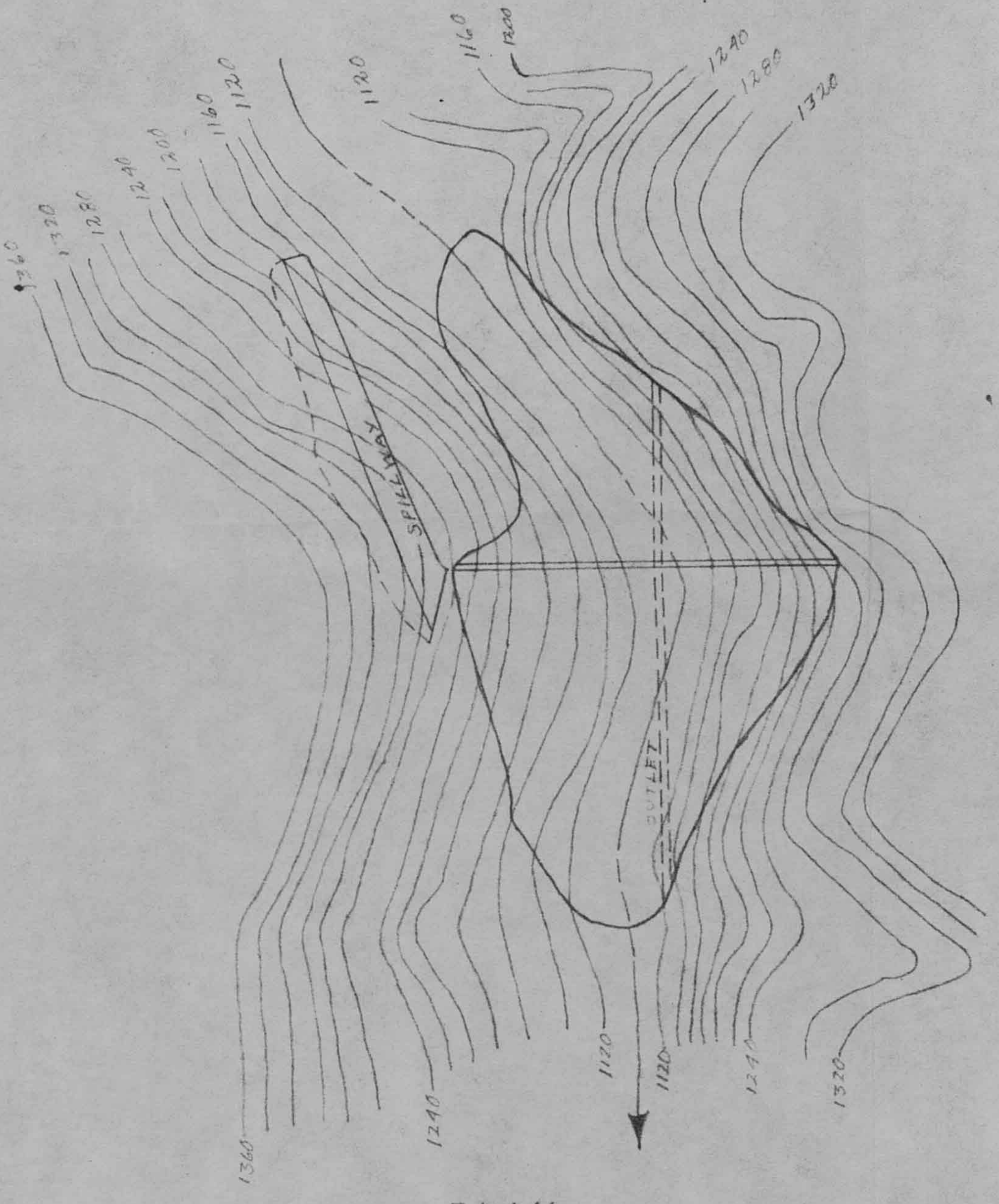

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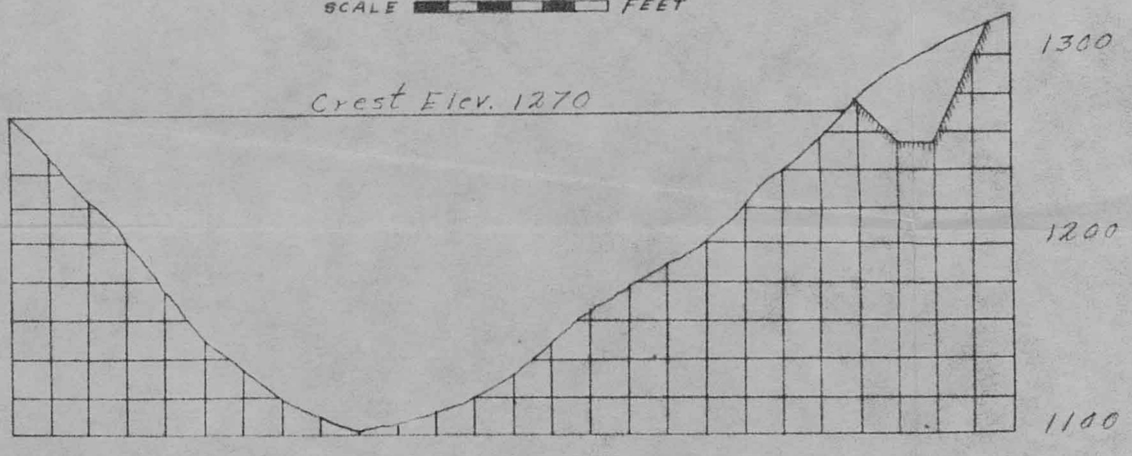

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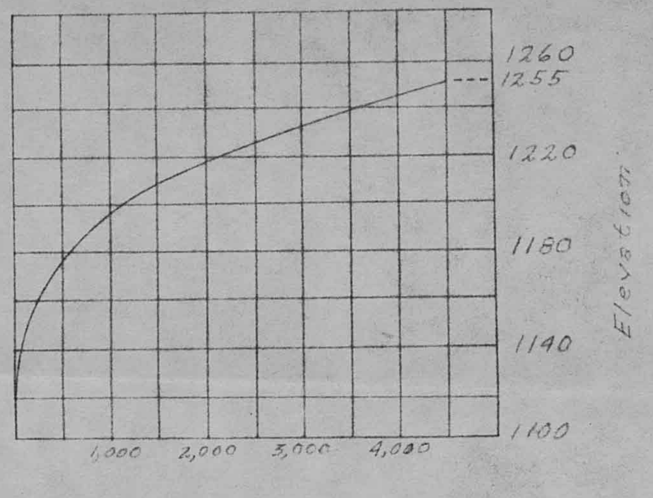

ACRE FEET
Capacity Curve

S. C. V. W. C. D.

PENITENCIA RESERVOIR